REMARKS

This Amendment is filed in response to the Office Action dated April 25, 2005. Accompanying this Amendment is a Petition for Extension of Time under 37 CFR 1.136(a) with proper fees, extending the period for response by three months, to October 25, 2005. Upon entry of this Amendment, claims 1 – 60 are pending in this application.

The Examiner rejects claims 1 – 60 under 35 U.S.C. §103(a) as allegedly upatentable over Hatono (US Pat. no. 5,914,936) and Bearden (US Pat. no. 6,871,233) in view of Challenger (US Pat. no. 6,216,212). Applicant disagrees and respectfully submits that the claimed invention is patentable over the cited references.

To establish a proper prima facie case of obviousness under 35 U.S.C. §103(a) , three criteria must be met. First, there must be some suggestion or motivation, either in the cited references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify or combine the cited reference relied upon by the Examiner to arrive at the claimed invention. Second, there must be a reasonable expectation that the suggested modification or combination would be successful. Finally, the prior art reference (or references when combined) must teach or suggest each and every limitation of the rejected claims. The teaching or suggestion to make the claimed modification or combination and the reasonable expectation of success must both be found in the prior art, and not based upon in the applicant's disclosure. M.P.E.P. §706.02.

Hatono is directed to an ATM exchange for performing flow control adaptively. Hatono teaches the so-called 'backwards diffusion equation' (Hatono equation 10, column 7 line 48), a second-order parabolic PDE. This is a 2nd order parabolic PDE with the independent variables time t and queue size x. The dependent variable y is the density function for the queue lengths of packets of data that the networking device (in Hatono's description, an ATM switch or exchange).

Hatono uses a variety of mathematical models (standard to the theory of Markovian queues and Brownian motion) to model the temporal dynamics of the queue(s) in a single network device (in his case, an ATM exchange). The teaching of Hatono is limited to the dynamics within the *single* networking device.

In significant contrast, the present invention uses the mathematics of spatial modeling, exemplified by population biology where an animal or plant is distributed over an area and the goal is to model the changes in the population at various locations as time progresses. To do this the present teaching employs partial differential equations (PDEs), for illustration the present invention cites the use of the so-called parabolic or heat equation with variable coefficients:

$$\frac{\partial u}{\partial t} + \frac{\partial(V_1(t,x,y,u)u)}{\partial x} + \frac{\partial(V_2(t,x,y,u)u)}{\partial y} = \frac{\partial}{\partial x}\left(D(t,x,y,u)\frac{\partial u}{\partial x}\right) + \frac{\partial}{\partial y}\left(D(t,x,y,u)\frac{\partial u}{\partial y}\right) + f(t,x,y,u)$$

where

$u(x,y,t)$ = population density

$f(x,y,t,u)$ = general sink/source terms such as lateral boundary flux (in mass density per unit time) and death/birth flux

$D(t,x,y,u)$ = diffusion coefficient

$V_1(t,x,y,u)$, $V_2(t,x,y,u)$ = advection coefficients

Note that the independent variables in this equation are x and y, which represent spatial coordinates, and t, which is time. The dependent variable is u, which is the population density, and is a function of the two spatial variables and the time variable. Thus, among other differences there is a crucial difference concerning the variables taught in the present invention, and that described in Hatono.

There is no attempt, teaching or suggesting in Hatono to estimate or reconstruct the spatial distribution of traffic in the network as recited in Applicant's claims. Hatono confines his focus to the dynamics within the single networking device.

Hatono is in fact attempting to solve a very different problem than the problem addressed by the present invention. A challenge in networking is determining when the network is congested and a device that is sending data into the network should reduce the rate at which it is

sending data until the congestion has eased. Hatono seeks to exploit certain properties of Markovian stochastic processes to infer from the temporal behavior of the local queue(s) as to whether congestion exists in the network; and hence an ATM exchange implementing his invention will use the inferences (in the form of two queue size thresholds and a time value, all derived from the above PDE) to execute flow control.

In significant contrast, the present invention seeks to map the global traffic levels and corresponding location(s) of congestion in a transport network. To do this, the present invention teaches collecting queue size measurements from a set of spatially representative sampling points, i.e. switches in the network being mapped. The computer executing algorithms then estimates the coefficient functions for the diffusion and advection forces in the network being modeled; and then solves the PDE to obtain the traffic (or, equivalently, population) distribution of the network at all its various locations.

With this spatial traffic map, updated continuously by repeating the sampling of queue sizes at the sample points, network devices can route traffic around locations that are congested, rather than simply deferring sending data into the network as is the case with the teaching of Hatono (and in fact for any simple flow/congestion control mechanism). Likewise, the placement of content caches in a network so as to minimize delay due to congestion can not be realized with Hatono; however it can be realized with the present invention.

Hatono teaches different mathematics to solve very different problems in networking, than that claimed in the present invention. Given the different very different approach of Hatono, Applicant respectfully submits that Hatono does not teach or suggest the claimed invention. Additionally, there is no motivation or suggestion in Hatono to arrive at the Applicant's claimed invention. Applicant respectfully submits that the claimed invention is patentable over Hatono.

As discussed above, Hatono does not teach or suggest the present invention. Applicant respectfully submits that the teachings of Bearden and Challenger either alone or in combination

add nothing more.

Bearden describes systems and methods for use in a policy goal-based management system employing service level goals for a computer network. In one embodiment Bearden employs a management server including a graphic interface that allows a user to easily specify parameters for service level QoS goals. As discussed above there is no attempt, teaching or suggesting in Hatono to estimate or reconstruct the spatial distribution of traffic in the network as recited in Applicant's claims. Hatono confines his focus to the dynamics within the single networking device. Assuming *arguendo* that one would be motivated to combine Hatono and Bearden, one would still not arrive at Applicant's claims.

Challenger describes a scalable method for maintaining and making consistent updates to caches. Challenger states that an object of the invention as constructing and maintaining objects to associate changes in remote data with cached objects. If data in a remote data source changes, database change notification are used to "trigger" a dynamic rebuild of associated objects. Thus, obsolete objects can be dynamically replaced with fresh objects. Again no where does Challenger address the issue of spatial distribution of traffic in a network. Challenger, either alone or in combination with Hatono and Bearden does not reasonably suggest Applicant's claimed invention.

Based on the above, Applicant respectfully submits that the application is in condition for allowance.

If any matters can be resolved by telephone, the Examiner is invited to call the undersigned agent at the telephone number listed below. The Commissioner is authorized to charge any additional required fees, or credit any overpayment, to Dorsey & Whitney LLP Deposit Account No. 50-2319 (Order No. A-69593/MSS (468930-4)).

Respectfully submitted,

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